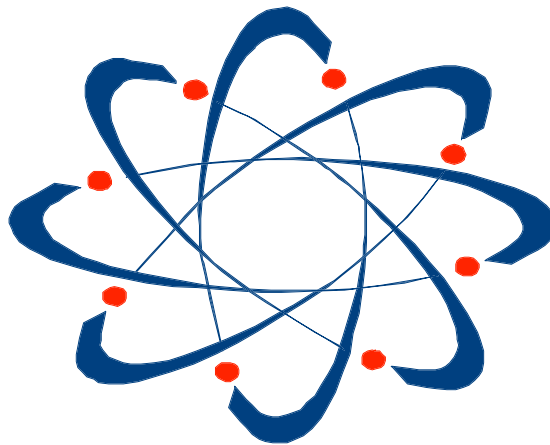


# **Properties and Measurement of Matter**

## **Science Module**

**Grades 4 -5**



**by**

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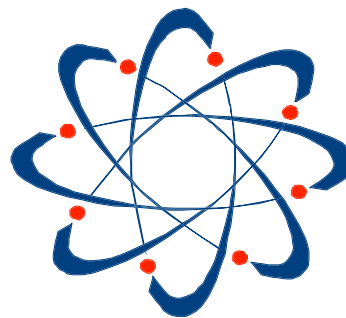
# Properties and Measurement of Matter

**Purpose:** This module requires that students demonstrate their knowledge of the properties and measurement of matter. Students will write the procedure for a laboratory experiment, follow the procedure to find an answer to a question, document the results using a chart, and use the results to draw a conclusion.

**Show-Me Standards Addressed:**

Knowledge: S 1, S 7

Performance: 3.1, 3.5, 4.1,



**Grade Level Range:** 6 - 8

**Subject Area:** Science

**Materials and Resources Needed:** Module Packet which contains the student response sheets, the student prompt, and the scoring guides, a set of materials for the experiment (one set for each group of students) : graduated cylinder, one piece of aluminum foil (10 cm. x 10 cm.), salt, tap water, 2 bowls, 30 pennies, and a pencil.

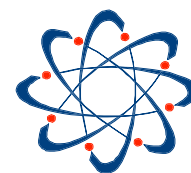
**Time Needed for Task:** 3 thirty - forty minute periods

**Instructions for Administration:** Provide students with the response sheets, and scoring guides. Go over the instructions and scoring guides so students clearly understand what is expected. The module may be administered in three sittings. The first sitting can be used to answer questions 1-14, the second sitting can be used to write the procedure for the experiment, and the third sitting can be used to follow the procedures to do the experiment, record the results, and answer the guiding question.

**Pre-assessment Instructions:** The students will need to have the prerequisite knowledge of the properties and measurement of matter. Additionally, the students need to know how to plan a procedure to find if objects float easier in salt water or fresh water. Students will need to know how to create a chart to record results and how to analyze the results to answer a question. Prior to doing this module, students should have had several opportunities to conduct simple experiments, collect data, and analyze results.

## Properties and Measurement of Matter

### Student Response Sheet # 1



1. What is the amount of material that is in an object called?
  - a) density
  - b) length
  - c) volume
  - d) mass
  
2. How do the properties of a compound compare with the properties of the element that form that compound?
  - a) The properties are the same.
  - b) The properties are different.
  - c) The properties can not be compared.
  - d) The properties cannot be measured.
  
3. What does a balance measure?
  - a) the mass of an object
  - b) the volume of an object
  - c) the volume of a liquid
  - d) the length of a solid
  
4. What is a graduated cylinder used to measure?
  - a) mass
  - b) volume
  - c) height
  - c) length
  
5. What is a meter stick used to measure?
  - a) density
  - b) liters
  - c) mass
  - d) length
  
6. When determining the volume of a rectangular solid , what formula is used?  

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7. If a solid object has a shape that cannot be accurately or easily measured, how can you find its volume?  

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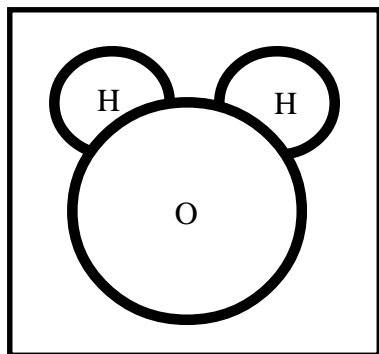
  

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## Properties and Measurement of Matter

### Student Response Sheet # 2

Use the drawing of a water molecule shown below to help you answer questions 8 - 10.



8. How many hydrogen atoms does a water molecule have? \_\_\_\_\_

9. How many oxygen atoms does a water molecule have? \_\_\_\_\_

10. Explain why a water molecule is a compound.

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Use the following information to answer questions 11 - 14.

**A group of students placed an ice cube on one side of a balance and a small wooden block on the other side. They balanced each other.**

11. Tell two ways the wooden block and the ice cube are the same.

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12. Tell two ways the ice cube and the wooden block are different.

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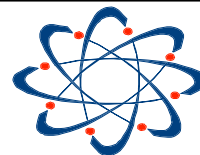
13. Describe a physical change that can happen to the ice cube that cannot happen to the block.

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14. What will cause the ice cube to go through the physical change described in number 13?

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**Properties and Measurement of Matter**  
**Student Response Sheet # 3**  
**Performance Event**



Tom was at the beach with his family. He noticed that it seemed easier to float in the ocean than in the lake back home. Tom knew that ocean water contained salt and the lake was fresh water. **Tom wondered if things float more easily in salt water than in fresh water.** He decided to set up an experiment to find the answer to his question. Help Tom set up an experiment to answer his question: Do things float more easily in salt water than in fresh water?

Before getting started, write an explanation of what you think you will find as a result of your inquiry.

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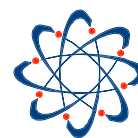
Tom will use the following materials to do his experiment. Be sure your plan for the experiment includes only the **materials** listed.

graduated cylinder  
salt  
2 bowls

aluminum foil (10 cm. x 10 cm.)  
tap water  
30 pennies

**Procedure:** Help Tom list the steps to find out if things float more easily in salt water or fresh water. Be sure to be specific when writing your steps. Number your steps and list as many as needed.

**Properties and Measurement of Matter**  
**Student Response Sheet # 4**  
**Performance Event**



You will follow your procedure and observe the results. Use the space below to create a chart to enter the data you observe. Be sure to title and label your chart so others can understand your results.

What adjustments did you need to make in your procedure to improve it?

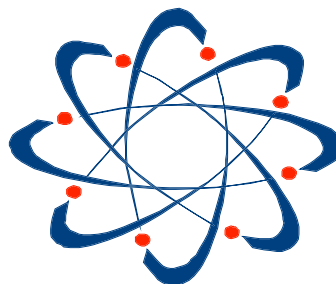
Based on your findings, answer the question: Do things float more easily in salt water or in fresh water?

What evidence proves this answer to be true?

## The Properties of Measurement and Matter Scoring Guides

### Items 1 - 5: Selected Response Items

- 1) d
- 2) b
- 3) a
- 4) b
- 5) d



### Item 6: Constructed Response Item

1 Point: The response contains the formula  $\text{Length} \times \text{Width} \times \text{Height} = \text{Volume}$  in any order.

0 Points: Other

### Item 7: Constructed Response Item

1 Point: A response that contains the concept of dropping the item into water and measuring the displacement of water.

0 Points: Other

### Item 8: Constructed Response Item

1 Point: The answer 2

0 Points: Other

### Item 9: Constructed Response Item

1 Point: The answer 1

0 Points: Other

### Item 10: Constructed Response Item

1 Point: The response contains the concept that water contains more than one type of element.

0 Points: Other

## **The Properties of Measurement and Matter Scoring Guides**

### **Item 11: Constructed Response Item**

2 Points:        The response tells two ways the items are alike (mass, both solids, or any other acceptable likeness).

1 Point:        The response tells one way the items are alike.

0 Points:        Other

### **Item 12: Constructed Response Item**

2 Points:        The response contains two ways the items are different from each other such as temperature, the fact that one melts and the other does not, color, taste, hardness, or any other acceptable differences.

1 Point:        The response contains only one acceptable difference.

0 Points:        Other

### **Item 13: Constructed Response Item**

1 Point:        The response contains the concept that the ice cube will melt or change forms.

0 Points:        Other

### **Item 14: Constructed Response Item**

1 Point:        The response contains the concept that the (warm) temperature causes the ice to melt or change forms.

0 Points:        Other

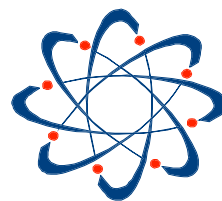
### **Performance Event: Prediction**

1 Point:        The response contains a reasonable prediction as to what the findings will be.

0 Points:        Other



## The Properties of Measurement and Matter Scoring Guides



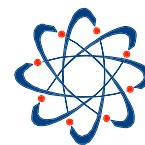
### Performance Event: Procedure

- 4 Points: The procedure contains clear concise steps that are accurate for finding in which type of water objects float more easily. There are enough steps given to make the procedure easy to follow. The steps are written in sequential, logical order. The procedure contains one variable to test and floatation trials in both fresh and salt water. The language used clearly communicates to the reader the procedure to follow. The procedure uses only the specified materials.
- 3 Points: The procedure contains steps that are accurate for finding in which type of water objects float more easily. There are enough steps given to make it possible to follow the procedure. For the most part, the steps are written in sequential order. The procedure contains one variable to test and floatation trails in both fresh and saltwater. The language used communicates to the reader the procedure to follow. The procedure uses most of the specified materials.
- 2 Points: The procedure contains some steps for finding in which type of water objects float more easily. Some steps may be missing making the procedure difficult to follow. The steps may not be written in sequential, logical order. The procedure may contain more than one variable to test and/or floatation trails in both fresh and saltwater may not be present. The language used make it difficult for the reader the procedure to follow. The procedure does not use all of the materials or uses materials not listed.
- 1 Point: The procedure is incomplete or contains critical errors. It is apparent that the student has little or no knowledge of the task.
- 0 Points: Off task or no attempt

### Performance Event: Following a Procedure/ Collection of Data

- 4 Points: The student followed the procedure and created an accurate chart of the observations. The chart is clear to understand and includes a title and labels.
- 3 Points: For the most part, the student followed the procedure and created a chart of the observations. The chart may contain minor errors. The chart can be understood and may have a title and some labels.

## **The Properties of Measurement and Matter Scoring Guides**



### **Performance Event: Following a Procedure/ Collection of Data (Continued)**

- 2 Points: The student attempted to follow the procedure and attempted to create a chart of the observations. The chart may contain critical errors and/or be incomplete and may be difficult to understand.
- 1 Point: It is apparent the student has little or no knowledge of the task.
- 0 Points: Off task or no attempt.

### **Performance Event: Making Needed Adjustments**

- 2 Points: The student listed many (or insightful) adjustments that need to be made.
- 1 Point: The student listed a few (or reasonable) adjustments that need to be made.
- 0 Points: Off task or no attempt.

### **Performance Event: Conclusion/ Support:**

- 4 Points: The student accurately answered the question to reach a valid conclusion and provided ample, accurate reasoning to support the findings.
- 3 Points: The student accurately answered the question to reach a valid conclusion and provided some accurate reasoning to support the findings.
- 2 Points: The student accurately answered the question and reached a valid conclusion but did not provide accurate reasons to support the findings.
- 1 Point: The student did answer the question or did not answer it accurately to reach a valid conclusion. Reasons may or may not be given but they are disregarded since they do not support a valid conclusion.
- 0 Points: Off task or no attempt.